

Travel-Associated Diseases: Trends, Knowledge's, Attitudes and Practices

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May 2010

A Community Based Masters Project presented to the faculty of Drexel University School of Public Health in partial fulfillment of the Requirement for the Degree of Master of Public Health

ACKNOWLEDGEMENTS

A special thanks to the organizations and people listed below who contributed to this project and made it successful

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Advisor: Seth L. Welles, ScD, PhD

John Glass and the Philadelphia International Airport

Eric Foster, Colleen Burke, and the Division of Disease Control

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TABLE OF CONTENTS

Abstract.....	v
Introduction.....	2
Background.....	3
Epidemiological Data.....	4
Accuracy of Pre-travel Advice.....	6
Travelers Knowledge, Attitudes, and Practices.....	6
Specific Aims.....	10
Part I: Case-Series Analysis	
Research Design and Methods Part I:	
Overview.....	11
Subjects.....	12
Methods of Data Collection.....	13
Institutional Review Board Considerations.....	13
Data Analysis Section.....	14
Results Part I.....	14
Discussion Part I.....	20
Part II: Knowledge Attitudes, and Practice Survey	
Research Design and Methods Part II:	
Overview.....	22
Subjects.....	22
Methods of Data Collection.....	22
Institutional Review Board Considerations.....	23
Data Analysis Section.....	23
Results Part II.....	24
Discussion Part II	29
Conclusions and Recommendations for Part I and II.....	31
References.....	34

LIST OF APPENDICES

Appendix A.....	Literature Review
Appendix B.....	Disease Information
Appendix C.....	Consent Form
Appendix D.....	Knowledge, Attitudes, and Practice Survey
Appendix E.....	Distribution of KAP study variables

LIST OF TABLES

PART I:

Table 1: Basic Demographics and Travel Characteristics for Malaria Cases from 2004-2009.....	16
Table 2: Basic Demographics and Travel Characteristics for Giardiasis Cases from 2004-2009.....	20

PART II:

Table 1: Basic Demographics and Travel Characteristics of Participants.....	25
Table 2: Distribution of Travel Destinations by Region.....	25
Table 3: Basic Demographics of Participants Traveling to High Risk Areas.....	28
Table 4: Comparisons of Travel Characteristics by Vaccine Preparedness.....	29

LIST OF ILLUSTRATIONS

PART I:

Figure 1: Number of Malaria Cases by Year.....	15
Figure 2: Dengue Cases by Year.....	17
Figure 3: Amebiasis Cases by Year and Travel Status.....	17
Figure 4: Hepatitis A Trends by Year and Travel Status.....	18
Figure 5: Giardiasis Trends by Year and Travel Status.....	19

PART II:

Figure 1: Distribution of Responses for Correctly Identifying Potentially Harmful Foods.....	27
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TRAVEL HEALTH: TRENDS, KNOWLEDGES, ATTITUDES, AND PRACTICES

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Background:

Travelers are at risk of acquiring disease while abroad. Travel-associated diseases can cause a range of illnesses and if left untreated, become fatal. Although preventable, the public health burden of these diseases remains significant. Very little is known about how travelers perceive risk associated with travel.

Objective:

Assess various aspects of travel health by administering a knowledge attitudes and practice survey and conducting a case-series analysis of five travel-associated diseases in Philadelphia residents from 2004-2009.

Methods:

The survey was administered to individuals waiting to board an international flight at the Philadelphia International Airport in March. The travel-associated diseases analyzed in the case-series analysis were defined as persons diagnosed with malaria, dengue, amebiasis, giardia, or hepatitis A that reported a history of travel during their investigation.

Results:

Approximately 201/246 (82%) persons completed the survey. Only 20% of the individuals reported obtaining pre-travel health advice. Approximately 21% could correctly identify all of the potentially harmful foods. Case-series analysis data showed from 2004–2009, 85/85 (100%) malaria, 10/10 (100%) dengue, 21/92 (23%) hepatitis A, 172/548 (31%) giardia, and 19/65 (29%) amebiasis cases were attributed to travel in Philadelphia. Among hepatitis A cases 100% did not receive vaccine and 58% of malaria cases did not take prophylaxis.

Conclusion:

Despite travel health recommendations, travelers are not utilizing preventative measures available to them including pre-travel health advice, vaccination, and prophylaxis. Respondent's knowledge of potential risk associated with travel appears low. To address gaps in knowledge educational efforts need to address all travelers about potential risks associated with travel.

Introduction

Relatively little is known about how travelers view the risks associated with travel while traveling abroad and if the travelers know or adhere to the precautions set forth by the World Health Organization (WHO) or the Centers for Disease Control and Prevention (CDC). This project sought to address this gap regarding what is known about traveler's preparations and their knowledge and adherence to the recommendations.

This study offered a unique opportunity to determine the distribution of travel-associated diseases in terms of person, time, and place among Philadelphia residents as well as travel health practices among persons flying out of Philadelphia International Airport. Examples of travel-associated diseases include: malaria, dengue, cholera and yellow fever. This project intended to provide insight into the subgroups of people that contracted these diseases and what countries they were contracted from. Assessing the knowledge, attitudes, and practices of current travelers was done in order to determine where travelers were going to seek travel health advice and identify the gaps in knowledge among travelers and travel health services. The study also was designed to provide an opportunity to assess the accuracy of the source of the advice that travelers receive. The results from the descriptive epidemiological review as well as the Knowledge, Attitudes, and Practices (KAP) survey can be utilized by the Philadelphia Department of Public Health to develop targeted educational information regarding travel health.

Philadelphia residents travel yearly to countries that put them at increased risk for contracting travel-associated diseases. The surveillance data for this project had not been looked at previously in an extensive manner. However, data over the past five years shows that approximately 300 Philadelphia residents contracted a communicable disease while traveling to an international country. This approximate number of cases is most likely underestimated due to

under-diagnosis and underreporting. Therefore, the true burden of these diseases is unknown. Public health efforts focus on prevention. The majority of communicable diseases, particularly those that are identified as travel-associated can be prevented through personal protective measures, vaccines, or prophylactic medication. Therefore, conducting a descriptive epidemiological review on these 300 cases can help to provide insight into the high-risk groups and behaviors.

Educating Philadelphia travelers regarding preventative measures remains an important step in reducing the morbidity and mortality associated with travel-associated diseases. Determining the higher risk groups as well as the gaps in knowledge among travelers will aid PDPH in developing better-targeted educational materials.

Background and Significance

International travel rates are continuing to increase significantly each year. According to the World Tourism Organization and the WHO, 903 million persons reported traveling internationally in the year of 2007¹. In 2007, there were over 64 million trips that departed from the United States to another country. The reason for travel varies and with this so does the risk for exposure to travel-associated diseases. The diseases that travelers come in contact with have changed. Some countries have become overall safer, but other countries are experiencing new diseases or the reemergence of past diseases. With the increase in international travel comes the increase in the risk of contracting disease.

The CDC estimates that approximately 4 million (8%) persons that traveled to a developing country were ill enough to request medical care. However, most travel-associated diseases can be prevented through vaccination, medications, or personal preventative measures. In spite of this, travelers are still contracting diseases during international travel². Therefore it is

important that travelers are aware of the diseases and risks associated with their travel and the precautions set forth by the CDC and the WHO. In addition, if travelers are not aware of the risks and precautions it is imperative that gaps in education are identified. Some studies have highlighted the lack of knowledge regarding travel health, the under utilization of pre-travel health advice, and the need for education.

Epidemiological Data Provides Insight into Travel Health

The current knowledge of risk for specific diseases and specific locations related to travel are limited because the true incidence rates are very difficult to determine. By the time most travelers experience symptoms, they have already returned to their countries of residence. It is also difficult to determine the exact number of travelers to a specific country or region due to the poor infrastructure in some of the destinations³. However, there are surveillance systems that help to collect epidemiological data regarding travel-associated diseases.

The Center for Disease Control and Prevention (CDC) currently collects and publishes data regarding select diseases. The CDC produced a list of nationally notifiable diseases that all health offices should report to the CDC's National Notifiable Disease Surveillance System (NNDSS). This list is revised periodically to include or exclude diseases. The list of notifiable diseases can differ slightly by state, and is only mandatory at the state level. Data on the notifiable diseases can be found in the Morbidity and Mortality Weekly Reports (MMWR)⁴. According to the data reported to NNDSS in 2009, there were approximately 17,548 giardiasis cases, 1,849 hepatitis A cases, and 1,169 malaria cases reported in the United States. In 2009, amebiasis and dengue were not nationally reportable diseases; therefore national data is not available for them⁵. The amount of giardiasis and hepatitis A cases due to travel is not available in this literature.

A more recent approach to obtaining epidemiological data regarding travel-associated diseases involves the usage of collaborative networks of travel medicine clinics to collect data on travelers experiencing illness after returning home. GeoSentinel, established in 1995, is an example of this type of network⁶. GeoSentinel is composed of 22-travel health clinics. Among the clinics, 14 of them are located in the United States and 8 are in various other countries. The principle behind GeoSentinel is that travel health clinics will detect any geographical or temporal trends in morbidity among travelers. Every patient returning from travel that is eligible and attends one of these travel medicine clinics is asked to complete a single-page form. This form asks questions regarding basic demographic information, travel history, symptom history, and final diagnosis of disease⁶. GeoSentinel has published data that provides insight into travel-related diseases by regions of the world and at present, is able to monitor any shifting trends in known diseases.

Knowing the risk associated with a specific disease for certain populations in a travel destination is essential to pre-travel health advice and education. Descriptive epidemiological data has become essential in providing the best possible risk assessment for travelers and subsequent health advice. Surveillance systems such as the NNDSS and GeoSentinel provide data that helps us to better understand the epidemiology of travel-related diseases. However, there are still limitations to the data and information available. The results from the descriptive review are designed to build upon the pre-existing body of literature. In addition, it is designed to highlight information that could be used to provide better pre-travel advice and aid in the development of better education materials⁷.

Accuracy of Pre-Travel Health Advice

Some authors suggest that travelers may be ill prepared for travel health even if they utilize pre-travel health advice. Some studies suggest that the information, medications, and vaccinations that travelers receive are not always accurate or appropriate. Therefore a few studies have focused on assessing the accuracy of the travel health advice, or have noted the inaccuracy of medications received prior to travel. These issues can result in insufficient protection of travelers and increase their risk of contracting diseases while traveling⁸.

A previous study assessed the quality of advice that travelers receive from German and Swiss general practitioners. 300 Swiss and German general practitioners were asked to participate in a telephone survey. The questions assessed their knowledge about the travel advice they would give patients for two holiday destinations (Kenya and Thailand). The study found that the degree of accurate pre-travel advice given was substandard in both of the study groups⁹. Very few studies have been done to address these concerns. However, a study conducted in the United States found similar results regarding the inaccuracy of travel health advice. This study found that only 25% of the health departments and clinics could correctly prescribe immunizations for travelers¹⁰. These two studies highlight an area of concern regarding the inaccuracy of pre-travel health advice given to travelers. Therefore it is important to assess the advice given to the travelers including medications and vaccinations.

Travelers Knowledge, Attitudes, and Practices

Knowing the high-risk groups and the occurrence of disease in specific regions is essential to travel health education. For many travelers the awareness of risk while abroad influences their choice of destinations and activities at their destination¹¹. Many studies have highlighted the underutilization of pre-travel health advice, the lack of knowledge regarding

travel medicine, and the large amount of travelers that are unaware of the health risks abroad¹². Studies have proposed numerous reasons why this is the case and have begun exploring those reasons. Authors have suggested that this could partly be explained by the lack of adherence to pre-travel advice or due to the receipt of inaccurate health advice including incorrect vaccinations or medications. These issues can increase the traveler's risk of contracting diseases while traveling¹³. Therefore, it is imperative to gain a better understanding of how travelers prepare for their trip, how they adhere to the advice given, and travelers opinions regarding the perception of risk during travel.

The European Travel Health Advisory Board utilized a KAP survey in order to assess the knowledge, attitudes, and practices associated with travel health. They conducted a pilot study in 2003. The main objective was to determine where travelers are obtaining pre-travel health advice, what information they are given, and to determine what protective measures travelers are employing. The study took place in three airports London Heathrow, Paris Charles de Gaulle, and Munich. The survey participants were approached while waiting at the departure gates and were asked to complete a self-administered KAP survey. The survey included questions regarding basic demographics, questions about their trip (destination and purpose etc.) and questions about their knowledge, attitudes, and practice (food habits, perceived risk, vaccination coverage, medications for trip etc.). These results were used to highlight the lack of knowledge among travelers and to enhance the KAP survey for future studies¹⁴.

From this pilot study, three major studies were conducted. One of the studies took place in the United States at the John F. Kennedy (JFK) International Airport¹⁵. Another study known as the European Airport Study, took place at nine different European countries¹⁶. Lastly, the same study was conducted at the Johannesburg International Airport. The survey methods

described above were the same for all studies¹⁷. The only difference was that these three studies used a slightly different KAP survey than the one given in the pilot study. They had two different questionnaires one based on malaria and the other on vaccine preventable diseases. The travel destination decided which survey would be taken.

The JFK study took place over a one week time period in 2003; during this time they surveyed 404 participants. This study utilized both the malaria and vaccine-preventable survey as mentioned above. The travel destination decided which survey the participant was to complete. Only 36% of the travelers sought pre-travel health advice, and of those that received advice only 10% reported utilizing travel medicine specialists. Over half of the participants reported their main reason for travel was vacation. Approximately 46% of the individuals traveling to a high-risk malaria country had antimalarial medications with them. 42% of travelers to high-risk malaria endemic countries such as sub-Saharan Africa had chloroquine. Chloroquine resistance is widespread in sub-Saharan Africa. The results showed that even though most of the participants were experienced travelers, the overall knowledge of risk associated with travel and the utilization of the preventive measures were low. The author concluded: educational initiatives need to be improved to provide better protection for travelers¹⁸.

The European Airport survey took place over one year; during this time they surveyed 5,465 participants. The study used the same methods as the JFK study. As seen in the JFK study, the majority of the survey participants were experienced travelers. 52% of the travelers sought pre-travel health advice, of those only 35% went to a travel health specialist. At least 20% of the participants that did not seek pre-travel health advice reported that they were unaware of the need to do so. 60% of the participants reported tourism as their main reason for travel. A subgroup analysis was conducted in order to compare travelers that reported visiting friends and

relatives (VFR) with tourists and business travelers. This analysis showed that tourists were more likely to be prepared for travel. Overall, this study concluded that educational initiatives need to target all travelers and that travelers need to be aware of and comply with the recommended travel health advice¹⁹.

The Johannesburg International Airport study took place over a two month time period and surveyed a total of 419 participants. The same methods were used in this study as in the other two studies. This study has found that approximately 86% of the participants had reported receiving travel health advice, a significantly higher proportion than in the previous two studies. The author made no attempt to explain why this study found that such a large proportion of the travelers sought pre-travel health advice compared to the other studies. In addition, the Johannesburg study also found that some travelers (19%) had inappropriate antimalarial medications. Approximately 30% of travelers did not have any antimalarial medications for their travel destination. The proportion of those with inaccurate antimalarial is smaller than seen in the JFK study, but it is still of concern for the authors. The most commonly reported source for the advice was travel health clinics (14%). Overall, this study found large gaps in the knowledge, and practices among the participants regarding vaccinations and malaria chemoprophylaxis²⁰.

These are the first major studies that target travelers at international airports to assess their knowledge, attitudes, and practices. The studies are based off a pilot study that was conducted to validate the survey tool prior to use in the three studies. However, all three of the studies mentioned above are subject to the nearly the same limitations. The studies are based upon self-reporting, which could lead to inaccurate responses and possible misclassification. The JFK study took place over a very short period of time and only at one airport making it less generalizable to all travelers in the United States. None of these studies collected information

from the individuals that refused to take the survey, therefore rendering them unable to determine if their sample is representative of the intended study population. In addition, the use of two different KAP surveys does not allow them to assess the overall knowledge of diseases and travel health. They could only assess someone's malaria knowledge or their knowledge about vaccine-preventable conditions.

There is a relatively small body of literature regarding this topic. Only one study has been done in the United States at one airport, to assess the knowledge of United States travelers. This project offered an opportunity to expand the literature available and determine if there are regional differences between travelers in the United States compared to the previous study.

Contributions of Proposed Project

The results from the study provided information that can be used to develop targeted educational materials for the Philadelphia Department of Public Health (PDPH) Division of Disease Control (DDC). This project was designed to enhance the DDC's surveillance data regarding the travel-associated diseases. Very little is known about what subgroups of travelers are at a higher risk for contracting illnesses while traveling abroad. This project provides insight into how Philadelphia travelers prepare for their trip or perceive their risk. The results from this study will help to facilitate program planning and educational materials for the PDPH regarding travel-associated diseases. The final study helps to reiterate the importance of education of all persons involved regarding travel health and preparation and helped to build upon the limited amount of literature available.

Specific Aims

- To develop risk profiles by performing descriptive epidemiological reviews of five travel-associated diseases in Philadelphia over the past 5 years

- To determine the knowledge, attitudes, and practices of Philadelphia travelers regarding travel health
- To provide the PDPH with the information collected from the project to inform the public about the risk of travel-associated diseases

Research Design and Methods Part 1 – Case Series Analysis

Overview of the study design

A descriptive epidemiological review of travel-associated diseases over the past 5 years was conducted. For the purpose of this paper, the terms descriptive review and case-series analysis will be used interchangeably. The travel-associated diseases were identified from a list of reportable conditions that were set forth by the PDPH and included dengue, malaria, hepatitis A, amebiasis, and giardiasis. Data was abstracted from disease investigation forms used by DDC. These disease-specific forms were used to collect information, such as basic demographics and information regarding potential risk factors, from the case. The data from the disease investigation forms were entered into a preexisting database, the Communicable Disease Registry (CDR). Due to the limitations of CDR, not all of the data from the investigation forms are entered into the database. Therefore, a supplemental database was created for each malaria and dengue using Microsoft Access. A database did not need to be created for giardiasis, amebiasis, and hepatitis A due to the extent of information on these diseases found in CDR. The data that was not captured in CDR was subsequently abstracted from the investigation forms and entered into the supplemental database. The supplemental data was merged with the data from CDR in order to analyze the data.

Subjects

To be included in the case-series analysis subjects were Philadelphia residents who met the CDC case definition²¹ for the specific disease. In addition, subjects must have reported traveled to a country endemic with that disease during the investigation. There were no specific exclusion criteria for participants. The PDPH is notified of potential cases by medical care providers, physicians, laboratories, or clinics in Philadelphia. These medical personnel are required by the Board of Health to report all notifiable diseases and conditions among Philadelphia residents to the PDPH DDC. The comprehensive list of reportable diseases can be found on the PDPH website listed within references²². Subsequently, all of the cases that were reported to the PDPH were contacted to complete the disease-specific investigation form. However, not all cases were able to be interviewed; therefore the analysis was limited to those cases where an investigation was completed. 85 malaria cases were contacted by the PDPH, of those 85, 83 were successfully contacted and agreed to answer the questions. Out of the 10 dengue cases, one dengue case had either refused to answer the supplemental questions on the disease investigation form or could not be contacted by the PDPH.

The data already received by the PDPH includes basic demographic and laboratory information. The supplemental data that is used for the case-series analysis was collected by the PDPH. Philadelphia residents that contracted any of the five diseases were either contacted by phone or in-person by field investigators from the PDPH Division of Disease Control. The individuals were asked to answer a series of questions regarding their disease/travel history. Their participation was voluntary. The data was collected for the purpose of public health surveillance and investigation.

Study Variables and Methods of Data Collection

Disease Surveillance Investigators (DSIs), from the Philadelphia Department of Public Health Division of Disease Control, collected the original data for the disease investigation forms that was used for the descriptive epidemiological review. As mentioned previously, these forms were used to collect supplemental information from a Philadelphia resident that is diagnosed with any of the reportable diseases identified by the PDPH. This information was either collected via an in-person interview or through a telephone interview with the patient, healthcare provider, or hospital infection control practitioner by a trained DSI from the DDC. The interview included disease specific questions, which were developed by the DDC, regarding relevant exposure histories including travel history, basic demographics, and signs and symptoms. The information for the descriptive review was abstracted from those disease specific investigation forms.

The primary dependent variables for the surveillance data were the five main travel-associated diseases—malaria, dengue, hepatitis A, amebiasis, and giardiasis. Basic information regarding the disease characteristics for each of the five diseases can be found in the appendix. The case definition, meaning the clinical definition as well as the case classification, partly determined if someone is considered a case. The case definitions for each of the diseases were based off of the CDC's definition for infectious conditions under public health surveillance. These were the criteria that were set forth for health departments to use when reporting notifiable diseases to the CDC²². In addition, to be considered a case for this study, international travel must be reported during the investigation periods for each disease.

Institutional Review Board Considerations

The case-series analysis portion of this proposed project was a secondary data analysis of the supplemental data collected on the disease investigation report. The original data were

collected from the Philadelphia residents for the purpose of public health surveillance and reporting, which does not constitute research. All of the data analysis was conducted at the PDPH DDC. No personal health identifying information linking the patient with the results of the study will be disclosed with the findings of the study. Therefore, this portion of the study did not constitute research and was exempt from IRB review.

Data Analysis Section

Data from the disease investigation forms were imported from Microsoft Access to Statistical Analysis Systems (SAS). Analyses of the data were conducted using SAS version 9.1 software. The majority of the questions have a categorical response. The open-ended questions, such as travel country, were summarized into travel regions. All data was cleaned and edited for missing risk factor information. Frequency distributions were used to determine the number of cases in Philadelphia and for all other descriptive statistics. Pearson chi-square tests were used for all categorical comparisons. When expected cell counts were less than 5, Fisher Exact tests were conducted in order to compare categorical data. In order to account for skewed data, Wilcoxon tests were conducted to assess the difference in median age.

Results Part 1: Case-Series Analysis

From 2004 to 2009 there were a total of 803 cases of giardiasis, amebiasis, hepatitis A, dengue, and malaria reported to the PDPH and subsequently investigated by the DSI's. Among the 803 total cases where risk factor information was reported, 307 (38%) of those cases were attributed to travel.

Malaria

There were a total of 85 malaria cases reported to the PDPH from 2004 to 2009. Of these cases, 83 (98%) were contacted and agreed to answer the questions for the disease investigation.

All 85 of the malaria cases reported were found to be attributed to travel. Figure 1 shows the malaria cases by the year they were reported to the PDPH. Overall, there was very little change from 2004 to 2006. The number of malaria cases appeared to decline in 2007 and increase again in 2008.

Figure 1: Number of Malaria Cases by Year

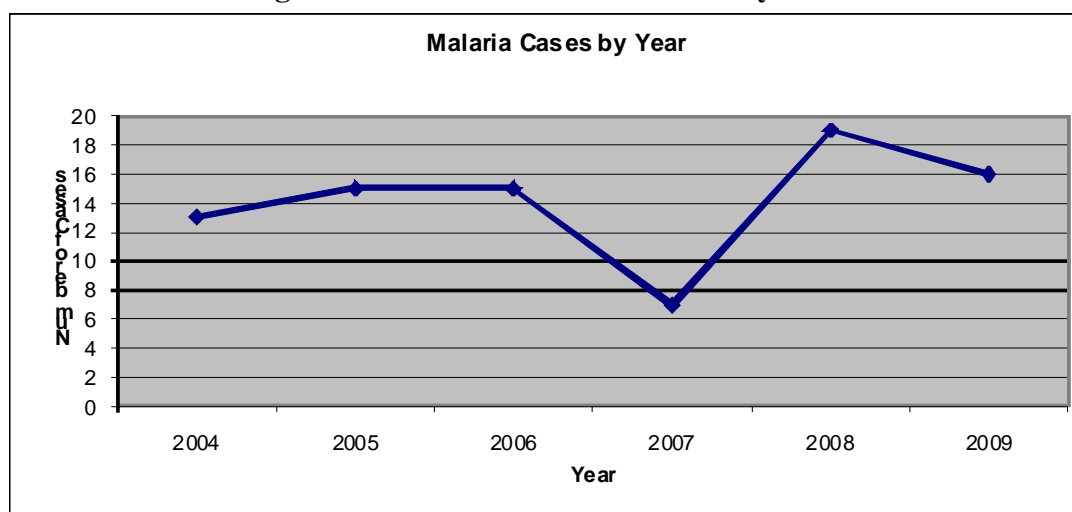


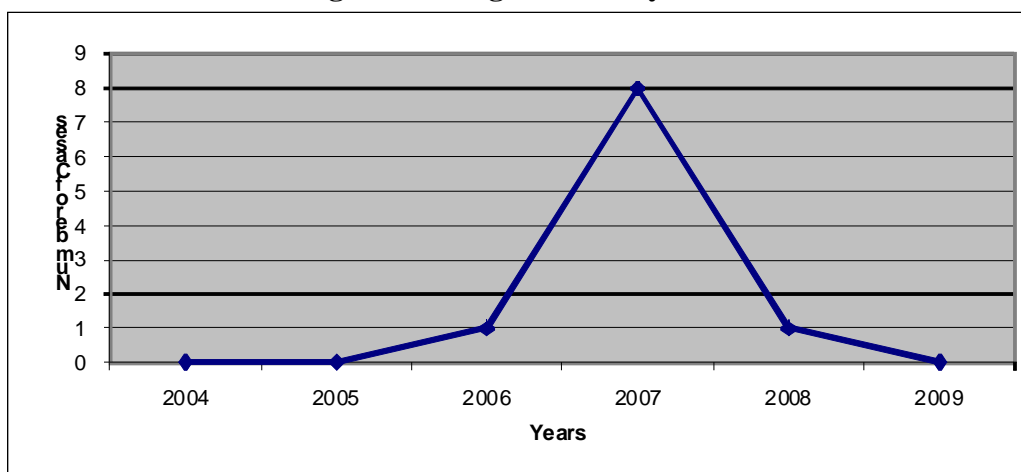
Table 1 provides descriptive frequencies of the basic demographics and travel characteristics of the malaria cases. Cases were more likely to be male (62%) and 70% were ill enough to be hospitalized. The most commonly reported travel destination was Africa (82%). Approximately 42% of the cases reported taking malaria chemoprophylaxis. Of the 32 cases, 20 (63%) reported the type of prophylaxis taken. The most commonly reported antimalarial medication was chloroquine (52%). The median age of cases was 31 years. The age distribution among these travelers shows that the cases appeared to be younger with 58/84 (69%) of malaria cases being 39 years of age or younger. There were no deaths reported among travel-associated malaria cases between 2004 and 2009.

Table 1: Basic Demographics and Travel Characteristics for Malaria Cases from 2004 - 2009

	n	%
Sex (n = 84)		
Male	52	62
Reason for Travel		
Visiting Friends or Relatives	41	51
Tourism	8	10
Refugee	12	15
Prophylaxis Taken		
Yes	32	42
Travel Region		
Africa	69	82
South Asia	12	14

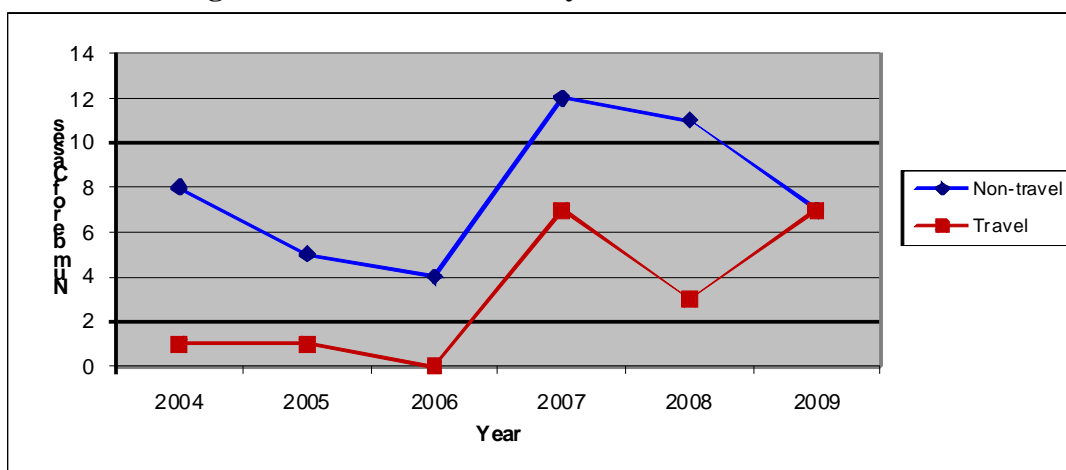
Dengue

There were a total of 10 cases of dengue reported to the PDPH during the five-year period. All of the cases were attributed to foreign travel. Only one case (10%) reported a previous history of dengue. Five of the cases (63%) reported that their birth country was the United States. Approximately 88% of the cases reported having a fever, the main symptom of dengue. The median age of cases was 29, and overall the cases appeared to be young with 70% being 39 years of age or younger. Only one case was hospitalized and there were no reported deaths among the dengue cases. Figure 2 shows the number of dengue cases reported by year. There were no cases reported in Philadelphia in 2004 and 2005. There was a peak in 2007 where 8 out of the 10 or 80% of dengue cases occurred. After the peak in 2007, there was a rapid decline in cases and no cases were reported in 2009.

Figure 2: Dengue Cases by Year

Amebiasis

There were a total of 66 cases of amebiasis that were reported to the PDPH from 2004 to 2009. Of the 66 cases that had reported travel history, 19 (29%) were attributed to travel. Figure 3 shows the number of travel-associated and non-travel amebiasis cases by year. The trends between non-travel and travel-associated amebiasis cases appear to be similar until 2009. Non-travel cases appear to decline slightly, while travel-associated cases increased.

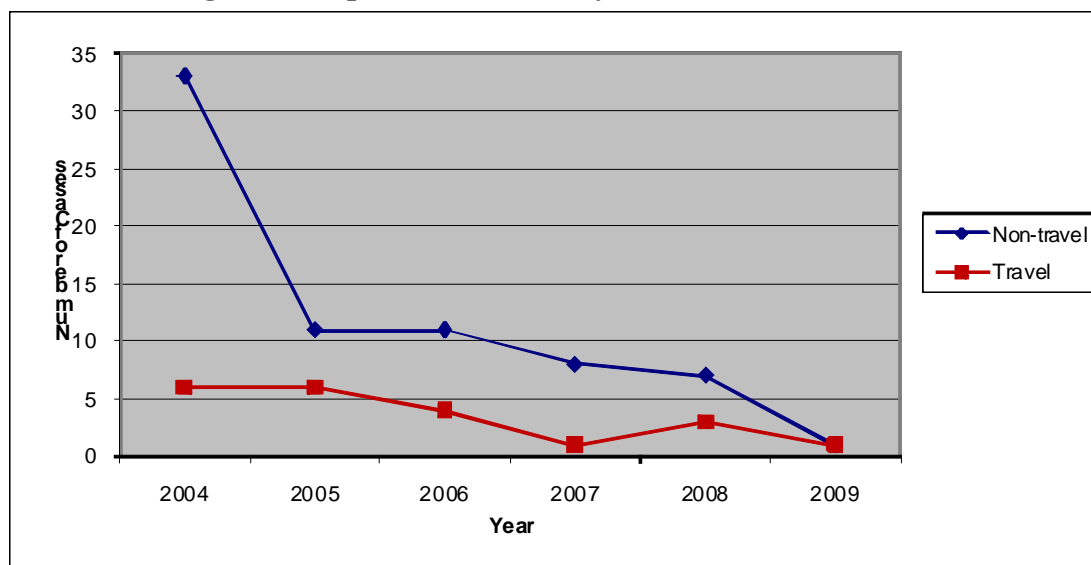
Figure 3: Amebiasis Cases by Year and Travel Status

The median age of travel-associated amebiasis cases was 26 and the age range was from 4 to 52 years of age. The age distributions among these travelers show that cases appeared to be overall young. Approximately 68% of cases were 29 years older or younger. The most common symptom among the cases was diarrhea (53%). Among the 18 cases that responded, 12 (67%) reported drinking water from a public source. Only one of the cases was hospitalized and there were no deaths reported. The most commonly reported travel destinations were Africa (42%) followed by Asia (26%).

Hepatitis A

A total of 92 hepatitis A cases were reported to the PDPH from 2004 to 2009. Among the cases that had travel history documented, 21 cases (23%) were attributed to travel. Figure 4 shows the trends of hepatitis A cases by year and travel status. The overall total amount of cases appears to have decreased since 2004. In 2004 there was a large gap between non-travel and travel-associated cases. That gap between travel-associated and non-travel was decreasing from 2005 to 2008. In 2009, there were two cases reported to the PDPH, one was attributed to travel.

Figure 4: Hepatitis A Trends by Year and Travel Status

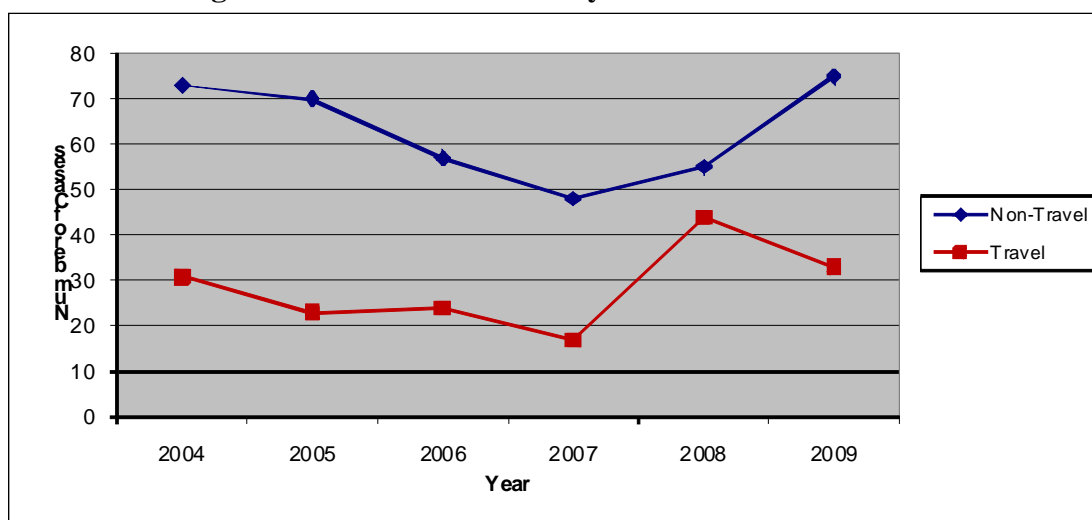


The median age of travel-associated hepatitis A cases was 23 and the cases ranged from three to 79 years old. The age distributions showed that the cases appeared to be overall young; 71% were aged 29 or younger. The most commonly reported symptoms were jaundice (95%) followed by nausea and vomiting (57%). Approximately 20% of the cases were hospitalized and no deaths were reported. Among the 16 cases that responded, 16 (100%) did not receive the hepatitis A vaccine. The most commonly reported travel destination was Asia (52%).

Giardiasis

From 2004 to 2009 there were a total of 550 giardia cases reported to the PDPH. Among the cases with available risk factor information, 172 (31%) were found to be attributed to travel. Travel-associated and non-travel giardiasis cases were compared. There was a significant difference (p value $< .0001$) in the median age between travel-associated cases (median age = 19) and non-travel cases (median age = 32). There was no significant difference in gender. Figure 5 shows the number of cases reported each year by travel status. The non-travel cases appeared to decline from 2004 until 2007 and then increase from 2007 to 2009. Travel-associated cases were sporadic until a peak in 2008. In 2009, there appeared to be a decrease in travel-associated cases.

Figure 5: Giardiasis Trends by Year and Travel Status



The median age of travel-associated giardiasis cases was 15 years old; the range was 1 to 76. The distribution across the age groups shows that cases appeared to overall young, with 75% of the cases being 29 years or younger. Table 2 shows the basic demographic information for the giardiasis cases that were attributed to travel. Over half of the cases were male and traveled to regions such as Africa or Asia. The most commonly reported symptoms of giardiasis were diarrhea (63%) followed by abdominal pain (41%). There were no reported deaths attributed to travel-associated giardiasis among the cases reported to the PDPH from 2004 to 2009.

Table 2: Basic Demographic and Travel Characteristics for Giardiasis Cases from 2004 - 2009

	n	%
Sex (n = 172)		
Male	98	57
Hospitalized (n = 156)		
Yes	11	8
High-risk Behaviors (n = 169)		
Swimming in untreated waters	47	27
Travel Region (n = 164)		
Africa	44	27
Asia	44	27
Europe	14	8
The Americas	41	25
Caribbean	21	13

Discussion Part 1: Case-Series Analysis

Overall, travelers appeared to be ill prepared for their trip. Among malaria cases, 58% reported not taking chemoprophylaxis and 100% of the hepatitis A cases did not have the hepatitis A vaccine prior to travel. Approximately 27% of giardiasis cases reported swimming in untreated waters, a potential high-risk behavior for contracting giardiasis. The majority of giardiasis cases were found in Africa and South Asia which is consistent with poor sanitation. In addition, 67% of the amebiasis cases reported drinking water from a public source, a potential high-risk behavior for this disease. The case-series analysis showed that overall cases were more likely to be male and for each disease cases appeared to be young with the median age for each

disease being 31 year or younger. This could be due to the fact that younger people may be more likely to engage in high risk activities rather than younger people being more susceptible to disease.

The body of literature on these diseases is limited thus making it hard to assess and identify groups that are potentially considered high risk. However, the data analyzed in this study does support the data found in other travel health literature. Africa still constitutes a significant risk for contracting malaria. In addition, the reason for travel does appear to have an effect. Previous literature found that people traveling to Africa for business were more likely to contract malaria, but this study found that people visiting friends and family were more likely to contract malaria than any other reason for travel. In addition, travel literature states that people traveling to developing countries that drink water from public sources and swim in untreated waters are at a higher risk for contracting water-borne illness, and this was seen among giardiasis and amebiasis cases in this study.

There are several limitations to this study. The data analyzed in this study is subject to underdiagnosis and underreporting, therefore the true burden of the disease is likely underestimated. In addition, the data collected had several missing risk factor information for each disease and the data were based upon self-report. Lastly, the data collected for amebiasis, giardiasis, dengue, and hepatitis A does not ask extensive information about travel characteristics. Despite the limitations of the case-series analysis, the information learned from this study can provide important information for educational efforts and preventative measures among travelers.

Research Design and Methods Part 2 – KAP Survey

Overview of the study design

A Knowledge, Attitudes, and Practice (KAP) survey was administered to willing participants who were waiting to board an international flight at the Philadelphia International Airport. The participants were given a consent form prior to completing the survey. The survey took approximately 10 minutes or less to complete. All recommendations and disease endemicity information for each travel region was taken from the CDC's Yellow Book.

Subjects

The participants were eligible if they were 18 year or older and were boarding international flight departing from the Philadelphia International Airport during the time interval that the study personnel were there and were United States citizens. The study personnel consisted of the researcher two members of the PDPH, and one additional Drexel student. In addition, survey participants had to be fluent in English, the language of the survey. Participants were asked to complete a self-administered KAP survey. These participants were recruited in person at the airport by one of the four study personnel. No incentives were given. Survey participation was completely voluntary. If the person refuses to participate a quick assessment of gender and age was assessed by the investigator. Information regarding the participation rate and basic demographics of the non-participants compared to the participants can be found in the results section.

Study Collection and Methods of Data Collection

A two-page self-administered survey was developed for this project in order to measure the knowledge, attitudes, and practices regarding travel health. This KAP survey was piloted among 20 individuals, 11 of the 20 were employees of the PDPH. The KAP survey was

improved after the suggestions of those who took the pilot survey. The data was collected from March 4, 2010 to March 15th 2010 at the Philadelphia International Airport. The KAP survey was utilized in this study because of the limited amount of time spent at the airport and the sample size. Survey participants were randomly selected from those who were waiting to board an international flight. The first time that data was collected the order that the people were chosen was based upon an electronically generated random number chart. Due to logistics and feasibility the random generated number chart was not used after the first visit to the airport. In subsequent visits people were asked to complete the survey if they appeared to not be occupied. The KAP survey is a cross-sectional snapshot of the differences in travelers with respect to travel health behaviors and demographics factors.

Institutional Review Board Considerations

The KAP survey was completely anonymous and voluntary, therefore posing no harm to the survey participants. Participants were given a brief introduction and consent form explaining the objectives of the study. After the initial survey, no further contact was made with the participants. The PDPH IRB has determined that this research project is exempt. Through the letter of reliance, the Drexel IRB also determined this project to be exempt.

Data Analysis Section

Analysis of the KAP survey data was conducted by using SAS version 9.1. Knowledge responses were coded as numeric. All questions were edited for missing responses, and the missing responses were dropped from analysis. All travel destinations were categorized by geographic regions. Subsequently, travel destinations were grouped together by the CDC's recommendations for travelers and disease endemicity information for analysis. Frequency distributions were conducted for basic descriptive statistics. Participants were scored on

preparedness measures based upon what preventative measures they took or are planning to take in regards to the disease risk at their travel destination. Pearson chi-square tests were conducted for all cross-tabular data. When the expected cell count was less than five Fishers Exact tests were used.

Results Part II

Study Population

A total of 329 participants were asked to complete the survey. Of these, only 296 met the inclusion criteria. Those that did not meet the inclusion criteria were not fluent in the language of the survey. 251 of the 296 agreed to participate in the study yielding a participation rate of 85%. Among the original participants, 50 were not United States citizens and were subsequently excluded from analysis. Among those that did not enroll in the study, all individuals reported that they were not interested in participation. A comparison was made between participants and non-participants. There was no statistical difference among each group with respect to age distribution and gender. Among participants, 45% were male while 36% of the non-participants were male.

Overall, 45% of the respondents were male and 93% reported that they have traveled outside of the United States prior to this trip. The majority of the participants were found in the 18 – 25 year old age group which accounted for 30% and the 46-60 which accounted for 35% of the respondents (Table 1).

Table 1: Basic Demographics and Travel Characteristics of Participants (N=201)

	n	%
Age Group (n = 200)		
18-25	59	30
26-35	24	12
36-45	20	10
46-60	69	35
Older than 60	28	14
Gender (n = 201)		
Male	91	45
U.S Citizen (n = 201)		
Yes	201	100
Traveled out of US Before (n = 201)		
Yes	186	93

Travel Characteristics for All Participants

Of the 201 participants, 49% were traveling to their destination for the first time. There were multiple reasons for travel reported, the most commonly reported reasons were tourism (62%) followed by visiting friends and family (32%). Over 60% of the participants reported traveling with at least one other person. The most common travel destination by region was Europe (see table 2).

Table 2: Distribution of Travel Destinations by Regions (N = 200)

	n	%
Region		
Africa	6	3
Asia	2	1
Middle East	11	5
Europe	147	74
Caribbean	30	15
Mexico	4	2

Travel Health Preparations

Approximately 160 (80%) participants began preparation for travel at least one month prior to travel date. Even though 166 (83%) of the participants reported seeking broad information about their trip, only 39 (20%) reported obtaining pre-travel health advice. Of the participants seeking travel health advice, the primary care doctor was the most commonly

reported source of information (55%). Participants older than 60 years of age were more likely to seek travel health advice prior to the trip. There was a significant difference between the utilization of pre-travel health advice across age groups ($\chi^2 = 10.5$, p-value = .03). However, there was not a significant difference between gender and utilization of pre-travel health services ($\chi^2 = .06$, p-value = .80). Of the 155 participants that reported a reason for not seeking pre-travel health advice, 67% felt that there were no medical concerns at their travel destination.

Among the 195 travelers that responded, 33 (17%) reported receiving or buying medicine or vaccinations specifically for this trip. Five of the eight participants that reported vaccination received hepatitis A and typhoid specifically for their travel destinations. Their travel destinations were Africa or Dominican Republic. 20 participants reported buying over the counter medications such as cold medicines, pain relievers, and anti-diarrheal's.

Vaccine Coverage among All Participants

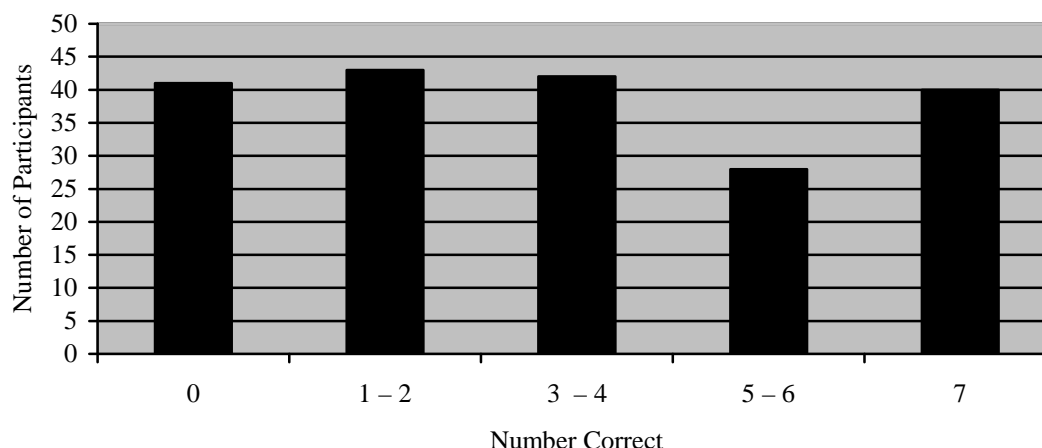
Overall vaccine coverage among the 194 participants appeared to be relatively low. Approximately half of the participants reported being immunized for hepatitis A or B. Among the travelers, approximately 65% reported being immunized for routine vaccines such as measles, mumps, and rubella (MMR) and polio.

Knowledge and Practices Regarding Travel Health

Among the 46 participants traveling to a malaria or dengue endemic area, 20% planned on using all three of these personal protective measures: sleeping under a mosquito net, covering arms and legs while outside in the evening, and using bug repellent. Approximately 30% of the participants did not plan on employing any of these measures. The most commonly reported measure that the participants planned to utilize was using bug repellent (57%).

Figure 1 shows the distribution of responses to the food knowledge question. Among the 194 participants that responded to this question, 21% correctly marked all seven items and 21% did not correctly identify any of the seven food items as potentially harmful. Approximately 66% of the participants correctly identified four or less of the seven foods as potentially harmful. Dairy products such as ice cream (27%) and milk (31%) were the least likely to be identified correctly as potentially harmful.

Figure 1: Distribution of Responses for Correctly Identifying Potentially Harmful Foods (N = 196)



Travel Characteristics and Health Preparations for Participants Traveling to High Risk Areas

Among the 201 participants, 59 (30%) were traveling to high risk areas for diseases such as hepatitis A, typhoid, malaria, or dengue. These travelers appear to be overall younger than the total population, 58% are 35 years or younger as shown below in table 3. Among the 59 travelers to high-risk regions, 20 (34%) sought pre-travel health advice. Primary care doctor (47%) was the most commonly reported source of pre-travel health advice. Of the travelers that did not seek pre-travel health advice 35 (68%) reported that they had no medical concerns about their travel destination.

Table 3: Basic Demographics of Participants Traveling to High Risk Areas* (N = 59)

	n	%
Age Group (N = 57)		
18-25	24	41
26-35	10	17
36-45	5	9
46-60	13	22
Older than 60	7	12
Gender (N = 57)		
Male	30	51
First time to travel destination (N=57)		
Yes	31	52

* High-risk areas included countries with: malaria, dengue, hepatitis A, and typhoid

A total of 34 participants were traveling to a potential malaria endemic area. These travel destinations included the Dominican Republic, India, and Africa. Of the 34 travelers, 26% reported receipt of malaria chemoprophylaxis. The types of antimalarial reported were chloroquine and malarone. Chloroquine was not prescribed to any participant traveling to Africa or areas with chloroquine resistance. All participants prescribed chloroquine and malarone reported taking the medication in accordance with the CDC's recommendations.

A total of 59 participants reported traveling to an area of intermediate or high levels of hepatitis A virus. Among the 58 travelers with available information, 66% reported having the hepatitis A vaccine. Of the 20 participants that did not have the vaccine, 95% did not seek pre-travel health advice. The participant that did not have the vaccine and sought pre-travel health advice reported obtaining their care from a travel health clinic.

A total of 50 participants reported traveling to an area of potential exposure to typhoid. Receipt of pre-travel health advice was reported among 15 participants (30%). Of the 49 with available information, 55% reported being immunized for typhoid. Among the 20 participants without the typhoid vaccine, 19 (95%) reported not seeking pre-travel health advice and 1 (5%) reported seeking pre-travel health advice from a travel health clinic.

Preparedness Measures for Participants Traveling to Vaccine-Preventable Regions

Among the study participants, 59 were traveling to regions with vaccine-preventable conditions such as hepatitis A and typhoid. Table 4 shows the comparisons of travel characteristics among those with and without the appropriate utilization of the hepatitis A or typhoid vaccine. Due to the small sample size, a person was considered prepared for their travel destination if they were partially prepared; meaning they had one or both of the vaccines recommended for their travel destinations. The only significant factor associated with vaccine preparedness was travel safety knowledge of potentially harmful foods (p-value = .0300).

Table 4: Comparisons of Travel Characteristics by Vaccine Preparedness (N = 58)

	Not Vaccine-Prepared (n = 15) n(%)	Vaccine-Prepared* (n = 43) n(%)	P-value
Gender (n = 58)			
Male	10 (67)	20 (47)	.1786
Female	5 (33)	23 (53)	
Age Category (n = 58)			
18 – 25	5 (33)	19 (44)	.1580
26 – 35	4 (27)	6 (14)	
36 – 45	3 (20)	2 (5)	
46 – 60	1 (70)	11 (26)	
Older than 60	2 (13)	5 (12)	
First time to travel destination (n = 58)			
Yes	6 (40)	25 (58)	.2252
No	9 (60)	18 (42)	
Food Knowledge Score ** (n = 49)			
Above Median	2 (18)	21 (55)	.0300
Below Median	9 (82)	17 (45)	
Food Knowledge Score (n = 57)			
Lower Quartile	7 (50)	12 (28)	.1916
All other Quartiles	7 (50)	31 (72)	

* Includes all respondents that reported being immunized for hepatitis A or typhoid vaccine or combination of hepatitis A and typhoid

** Not including the number of participants at the median level

Discussion

The comparisons between the non-participants and the participants showed that there was no significant difference in basic demographics between the two groups indicating that there

is a small chance for selection bias. Overall, the participants appeared to be experienced travelers and the majority of the subjects began preparing for their travels a month or more before their trip. Therefore, the majority of participants had time to adequately prepare for their travels. However, the participant's health preparation prior to their travels appears to be low. Most of the respondents did not seek pre-travel health advice or did not obtain preventive medications specifically for their trip, with the majority reporting that they knew all the necessary information about their travel destination or had no medical concerns. However, participants traveling to areas with preventable diseases such as typhoid, malaria, and hepatitis A appeared to have relatively low adherence to the recommendations regarding vaccine coverage and anti-malarial utilization. Only 66% were vaccinated for hepatitis A, and 55% were vaccinated against typhoid. Among the participants that were not immunized for these vaccines, over 90% did not seek pre-travel health advice.

When comparing the travel characteristics among those with and without the appropriate utilization of the hepatitis A or typhoid vaccine, the only statistically significant factor associated with vaccination was travel safety knowledge. There was no significant differences in vaccine-preparedness measures with regards to gender, age category, or first time to travel destination status. Therefore, a profile for preparedness measures or lack thereof could not be created based on demographic information.

The results from this study are fairly consistent with the current body of literature available on the knowledge, attitudes, and practices among travelers. Overall, travelers still appear to be ill prepared regardless of where geographically the study takes place. Previous studies found that less than half of their study participants sought pre-travel health prior to travel, which is consistent with these study findings. As seen in the data above and in pre-existing

studies, travelers were not sufficiently protected against hepatitis B, hepatitis A, and malaria. The current literature has found that even if people are seeking pre-travel health advice they may be receiving inadequate medications, such as chloroquine when traveling to an area with chloroquine resistant malaria. These study findings dispute that literature. All of the participants in this study that were prescribed to chloroquine were not traveling to an area of chloroquine resistance. However, these results must be taken in the context of the small number of travelers in this study that were prescribed chemoprophylaxis.

There are several limitations to the survey's findings. The airport utilized in this study was not ideal. There are relatively few direct flights to high-risk travel destinations. The data collected were based-upon self-report and the vaccination responses could not be verified with a vaccination certificate. In addition, the data was only collected over a two-week time frame and the survey was only available in one language. Therefore, the results may not be generalizable to the general population or to those who do not speak English. Only 29% of the participants traveled to high risk areas for diseases like hepatitis A, dengue, malaria, and typhoid. Due to the small sample size a person was considered 'prepared' if they had only of the two recommended vaccines for hepatitis A and typhoid endemic areas. Therefore, the number of participants that were considered prepared is overestimating the true number of travelers that were actually prepared for their travel destination. Even with these limitations, the study results can still provide useful information about the knowledge, attitudes, and practices among current travelers.

Conclusion and Recommendations for Parts I and II

The majority of the cases in the descriptive epidemiological review reported engaging in high-risk behaviors or not utilizing preventative medications and vaccinations when a preventative measure was available to them. The majority of the participants in the knowledge,

attitudes, and practice survey did not seek pre-travel health advice or reported that they did not plan on employing personal protective measures to prevent disease at their travel destination. In addition, only a small proportion of survey respondents could correctly identify all potentially harmful foods. With respect to these findings the following conclusions can be made regarding the cases and participants in these studies: overall the traveler's adherence to the recommendations set forth by the CDC and the WHO are low and traveler's are not adequately utilizing pre-travel health resources and the preventative measures available.

Recommendations for Future Research

Future research should be conducted among United States travelers in order to fully understand their attitudes and practice regarding travel. In order to gain a comprehensive knowledge of traveler's practices and attitudes these studies should take place at multiple large international airports throughout the United States and should take place over a longer period of time. Questions should be asked that determine what traveler's attitudes towards personal preventative measures are and what measures they intend to practice while at their travel destination. The results from this study highlight the importance of travel safety knowledge with respect to preparedness measures. Therefore, future studies should be conducted that look more extensively at the knowledge of travelers with respect to the symptoms of disease, preventative measures available for disease, and the risks associated with their travel destinations.

Recommendations for the Philadelphia Department of Public Health

The results from the descriptive epidemiological review and knowledge, attitudes, and practice survey reinforce the idea that public health efforts regarding travel health need to focus on the education of all travelers. Recommendations for the PDPH include developing educational materials for all travelers that focus on the importance of pre-travel health advice in

remaining healthy while abroad. Solely educating travelers to obtain pre-travel health advice from travel health specialists is not enough. Travelers must adhere to the recommendations given to them and know the risk associated with their travels. Therefore, educational materials should also focus on the possible health concerns or risk associated with traveling abroad, the importance of the preventative measures that are available to prevent disease such as vaccines and personal protective measures, the importance of taking all medications as prescribed, and the overall importance of being prepared for travels. The method and place in which to distribute the educational materials to the travelers is difficult to determine. Targeting travelers at the airport can be too late if the traveler needed a vaccine or prophylaxis prior to trip. However, some suggestions include: expanding upon the preexisting information on the PDPH's website or identify key primary care office that will distribute educational pamphlets to any patient traveling. Federally, the PDPH could work in conjunction with the CDC to improve travel health educational materials or work collaboratively with airlines in order to develop health information about each travel destination that would be presented after ordering an international flight ticket.

Additional recommendations could be made to the PDPH that would allow for a more complete understanding of the travel characteristics of the cases that are investigated by the disease surveillance investigators. For diseases that are endemic in the United States such as giardiasis and amebiasis, additional questions regarding purpose of travel, exact travel dates, and more comprehensive risk factor questions that are specific to their actions while traveling could be asked in order to better distinguish non-travel cases from travel cases. For diseases like dengue and malaria additional questions could be asked in order to assess the utilization of personal protective measures like using bug spray. This can help determine whether cases are contracting these illnesses because of failure to use personal protective measures.

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APPENDIX A

Literature Review Form Article 1
Description of Study and Findings

INTRODUCTION

Article Title	Pre-travel Health Preparation Among US Residents Traveling to India to VFR's: Importance of Ethnicity in defining VFR's
Author(s)	Henry C. Baggett Susan Graham, Phyllis E. Kozarsky
Journal	International Society of Travel Medicine
Date Published:	(year) 2009 (volume) 16 (pages) 112-118
What is the main objective of the study?	To determine factors that could contribute to higher infection rates among US residents traveling to India to visit friend and relatives.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total eligible: 1,574 Total n: 1,302 Male: 60% Mean age: 37 VFR: 75%	Inclusion Criteria At least 18, traveling to India from 1 of 3 airports, spoke English, and lived in the US	Exclusion Criteria: None
Data Collection Procedure Interview <u>Self Adm Survey</u> CASI CAPI Record Abstraction Administrative Data		

METHODS OF ANALYSIS

Comparisons: Categorical data: Chi-square test	Continuous: Student's t-tests
Multiple variable methods: Multivariate logistic regression	

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

34% of VFR's reported seeking travel health advice, most common reason for not was lack of awareness that advice was needed. VFR's were less likely to be protected against hepatitis A and malaria and less likely to seek travel health advice than non-VFR. VFR's were less likely to associate their travel to India with risk for malaria. These results differed by Ethnicity. 36% of travelers not vaccinated for Hep A were told not to be by their primary care provider. South Asians had a poor rate of pre-travel health advice regardless of VFR status.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Prevention efforts should focus on increasing awareness of risk among travelers and clinicians. More controlled studies should be done that include careful measures of pre-travel health preparation, reason for travel, and exposures during travel. In addition, ethnicity matters regardless of VFR status.

Do their results agree or disagree with the other literature cited? Disagrees with previous studies beliefs that financial barriers were the reason for VFR not seeking pre-travel advice (90% had college education). Agrees with Geosentinal network about precise definition of VFR matters.

Strengths of the Study?

Used a clear definition of VFR (accounts for reason of travel and ethnicity or country of birth and travel destination).

Limitations of the Study?

Not generalizable to US travelers— 90% had a college education, and enrolling only travelers going to India. Could have selection bias, since those who agreed to participate could differ from those who did not (English vs. Non-English speaking). Study design does not allow for causal inferences or to determine the incidence of travel-related infections among participants.

Literature Review Form Article 2
Description of Study and Findings

INTRODUCTION

Article Title	Traveler's Knowledge, Attitudes, and Practices on Prevention of Infectious Diseases: Results from a pilot study.
Author(s)	Koen Van Herck, Jane Zuckerman, Fransesco Castelli
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 10 (pages) 75-78
What is the main objective of the study?	To determine the travel health knowledge, attitudes, and practices (KAP)

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 609 Male: 54%	Inclusion Criteria Passengers traveling to a developing country from one of three airports who were 18 years or older and could understand the language of the survey.	Exclusion Criteria: Passengers traveling to Japan, Singapore, and Latin America.

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Frequencies among responses

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

64% of those traveling to areas of high malaria risk, perceived their risk as high. Only 14% of travelers planned to restrict their diet of all potentially harmful foods. 40% of travelers had not sought any travel health advice. Of those who did 72% went to their general practitioner.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

The purpose of this was to get the first look at traveler's KAP and determine if this was a feasible method and study. This study showed the need of asking better questions to be able to accurately assess the risk of malaria and other vaccine preventable diseases. In addition, it highlights the importance of raising awareness among travelers, and educating clinicians as well as travelers.

Do their results agree or disagree with the other literature cited? No literature cited

Strengths of the Study?

Gave the first look at traveler's KAP through use a survey

Limitations of the Study?

Small sample size, and was only done at a few airports over a brief period of time. Selection bias could be introduced: respondents could be different than those who refused.

Literature Review Form Article 3
Description of Study and Findings

INTRODUCTION

Article Title	Travel Health and Knowledge Attitudes and Practices Among United States Travelers
Author(s)	David H. Hamer and Bradley A. Connor
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 11 (pages) 23-26
What is the main objective of the study?	To determine the travel health knowledge, attitudes, and practices (KAP) of United States traveler's departing from the JFK Airport in New York.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 404 Male: 52% Mean age: 42.4	Inclusion Criteria Participants must be traveling to a targeted travel destination identified as high risk, not a resident of the target destination, and at years or older.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Frequencies among responses

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

Only 36% of those traveling sought pre-travel health advice; the main reason for not was that most felt they already knew what to do to protect them. Of those who did, 46% used their primary care provider. A small proportion (2.6%) of traveler's to areas with no malaria were prescribed anti-malarial. Only 46% of respondents felt that vaccines were safe.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Even though the majority of the traveler's were experienced, the overall knowledge of or risk and preventative practices were relatively low. International travelers were more likely to seek general travel information than travel health advice. 42% of those traveling sub-Saharan Africa were prescribed chloroquine (which is an area of chloroquine resistant malaria). These survey's underscore the need for education

Do their results agree or disagree with the other literature cited? Agree: Other studies found an under utilization of travel health specialists – this study found only 10% utilized travel health specialists.

Strengths of the Study?

Persons traveling to malaria endemic countries were given a malaria-based questionnaire instead of a general travel health.

Limitations of the Study?

Small sample size is a limitation. It was only done at one airport in the US over a brief period of time. Selection bias could be introduced: respondents could be different than those who refused. Based on self-reporting which could bias the results.

Literature Review Form Article 4
Description of Study and Findings

INTRODUCTION

Article Title	Knowledge, Attitudes, and Practices in Travel-Related Infectious Diseases: The European Airport Study
Author(s)	Koen Van Herck, Francesco Castelli, Jane Zuckerman
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 11 (pages) 3-8
What is the main objective of the study?	To evaluate current travel health knowledge, attitudes, and practices and to determine where travelers going to developing countries are obtaining travel health information, what information they receive, and what preventative personal measures they are taking.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total eligible n: 5,465 Total n: 5,067 Male: 50.4%	Inclusion Criteria Individuals traveling on an intercontinental flight to developing countries, person was at least 18 years old, and understood the language of the survey.	Exclusion Criteria: Nationals of a developing country

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was entered into MS Access and analyzed Using excel and MS excel

Comparison of proportions: Pearson chi-square test

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

70.9% indicated tourism was the main reason for travel. 73% of travelers sought general travel information; only 52% sought travel health advice, most reported reason for not was that they felt they knew what to do. 57.4% who did seek travel health advice – got it from their doctor. Respondents were not able to assess their own risk for vaccine preventable diseases. Those visiting friends and relatives (VFR) were less likely to be protected for Hep A. 12.2% of individuals with no malaria risk carried anti-malarial drugs.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Educational materials should be provided for those giving travel health advice and travelers.

Do their results agree or disagree with the other literature cited? No comparisons were made to previous literature

Strengths of the Study?

Surveys were available in all frequently used languages of the respective countries. Interviewers tried to validate vaccine history by looking at traveler's vaccination records. Sample size was large, and utilized travel health specialist to determine areas at high risk.

Limitations of the Study?

Could have selection bias, since those who agreed to participate could differ from those who did not (less prepared might not)

Literature Review Form Article 5
Description of Study and Findings

INTRODUCTION

Article Title	Knowledge, Attitudes, and Practices on the Prevention of Infectious Diseases: Results from a study at Johannesburg International Airport
Author(s)	Stephen Toovey, Andrew Jamieson, and Michele Holloway
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 11 (pages) 16-22
What is the main objective of the study?	To determine the knowledge, attitudes, and practices with respect to infectious disease prevention of departing traveler's from an airport that acts as a hub for travel to Africa.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 419 Mean age: 42	Inclusion Criteria Individuals traveling to a developing country, person was at least 18 years old, and understood the language of the survey.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was entered into MS Access and analyzed Using excel and MS excel

Comparison of proportions: Pearson chi-square test

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

Tourism was the most common reported reason for travel, followed by business. 86% reported seeking pre-travel health advice, travel clinics being the most commonly reported (25%). Majority of travelers reported that they would employ personal protective measures such as: repellent etc. 80% of travelers to non-malaria endemic areas perceived themselves at high risk for malaria. 91% recognized fever as main symptom of malaria. Inspection of vaccine history certificate found discrepancies among 63% of the respondent's answers.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

26% of high risk for malaria travelers was not carrying anti-malarial medications. Educating travelers can be done efficiently using the internet and may be the preferred way. There needs to be an improvement in the delivery in public health messages, and in encouraging the uptake of vaccinations.

Do their results agree or disagree with the other literature cited? Author did not cite any other information.

Strengths of the Study?

Validated the vaccine history by looking at vaccine certificates if they were available.

Limitations of the Study?

Small sample size was used. Could have selection bias by those who chose not to participate may be different than those who choose to participate. Based on self-reporting

Literature Review Form Article 6
Description of Study and Findings

INTRODUCTION

Article Title	Knowledge Attitudes and Practices Evaluation About Travel Medicine in International Travelers and Medical Students in Chile
Author(s)	Lisette Guerrero-Lillo, Jorge Medrano-Diaz
Journal	Journal of Travel Medicine
Date Published:	(year) 2009 (volume) 16 (pages) 60-63
What is the main objective of the study?	To elucidate the knowledge of risk for travel-related diseases, symptoms, and accidents in a population of Chileans who travel to popular tourist destinations, as a preliminary observation. Then a KAP survey will be done including international travelers and a group of medical students from the same country for comparison purposes.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 200 Travelers: 100 Students: 100	Inclusion Criteria Individuals were sampled randomly by chance of being in the airport and the school at that given time.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Statistical analysis using SPSS 10.0 and Epi Info 6.0
Chi-square used for qualitative variables
Student's t-test were used for quantitative

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

From the total including both groups 78.5% of travelers and medical students stated no knowledge of travel health. 3% of the travelers had some sort of vaccination in their lives, but not for their trip. Malaria was reported as the most risky travel-related disease between both groups. Tourism was the most reported reason for travel.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

These survey's underscore the need for education especially in areas like Chile, where this is a relatively new and developing topic and area of discussion. Because of an increase in travel activity, the importance of qualified pre-travel health advice is an increasing need in all countries. Travel patterns and behaviors need to be taken into account when developing evidence-based travel medicine.

Do their results agree or disagree with the other literature cited? Agree that education is lacking in travel health.

Strengths of the Study?

Had a comparison group to compare the Chileans to.

Limitations of the Study?

Small sample size, and was only done at one airport over two days. Based on self-reporting

Literature Review Form Article 7
Description of Study and Findings

INTRODUCTION

Article Title	Knowledge, Attitudes, and Practices, Among Foreign Backpackers Risk in Southeast Asia
Author(s)	Watcharapong Piyaphanee
Journal	Journal of Travel Medicine
Date Published:	(year) 2009 (volume) 16 (pages) 101-106
What is the main objective of the study?	To assess the knowledge attitudes and practices among backpackers in Southeast Asia.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 434 Male: 55 Mean age: 28	Inclusion Criteria Had to be a foreign backpacker	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was analyzed using SPSS for Windows version 10.0.7
Students T test and Chi-square was used

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

74.4% of these travelers had sought some sort of travel health information before coming to Southeast Asia. The most common source was travel clinic / general practitioners. Ten true false questions were used to assess the individual's knowledge. Backpackers who received pre-travel health advice had a mean score of 5.71 whereas those that did not seek pre-travel advice had a mean score of 5.15. Nearly 40% of backpackers stated that they were not going to employ any protection against malaria. 48.8% believed there was malaria risk in Bangkok when there isn't. Among those traveling in forested areas, 57.6% used anti-malarial medications. Of those who took the medicine, nearly half said they missed a dose and 30% stopped taking them prematurely.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Overall, the knowledge of malaria risk and prevention was lacking. 34% believed they could get malaria from dirty food and beverages. This study showed that those who did go to a travel health clinic had a higher mean score average than those that did not. This study highlights the need for pre-travel health advice.

Strengths of the Study?

First study to look specifically at backpackers

Limitations of the Study?

Data was collected only from foreign backpackers in Bangkok and may not represent all foreign backpackers.

Literature Review Form Article 8
Description of Study and Findings

INTRODUCTION

Article Title	Travel Health Knowledge, Attitudes, and Practices, among Australasian Travelers
Author(s)	Annelies Wilder-Smith, Nor S. Khairullah, Jae-Hoon Song
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 11 (pages) 9-15
What is the main objective of the study?	To assess the knowledge attitudes and practices among Australasian travelers regarding travel-related infectious diseases.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 2,101 Male: 56% Mean age: 37.6	Inclusion Criteria Had to be departing 1 of 5 airports and traveling to Asia, Africa, or South America.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was entered into MS excel and analysis was performed with Stata 7.0
Used Chi-square or Student t tests

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

61% of travelers reported tourism or holiday as their main purpose. 60% had sought general information regarding their travel destination, mainly from a travel agent. Only 32% sought travel health advice from any specialist, of these only 12% sought advice from a travel medicine specialist. The main reason for not be vaccinated was "unaware of the need to do so". The uptake of vaccines prior to travel was very low. 71% correctly identified fever as the main symptom of malaria. Only 7% carried prophylaxis with them.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

The factors that influenced uptake of pre-travel health advice were: higher education, longer duration of travel, perceived high risk of malaria, and travel to rural areas. There is an urgent need for increased awareness about travel-related infectious diseases among Asian travelers.

Strengths of the Study?

Larger sample size

Limitations of the Study?

Selection bias could be introduced if those who refused to take the survey were different than those who participated in the study. Based on self-reporting.

Literature Review Form Article 9
Description of Study and Findings

INTRODUCTION

Article Title	Illness in Long-Term Travelers Visiting GeoSentinel Clinics
Author(s)	Lin H. Chen, Mary E. Wilson
Journal	Emerging Infectious Diseases
Date Published:	(year) 2009 (volume) 15 (pages) 1773-1782
What is the main objective of the study?	To evaluate the effect of trip duration on illness in travelers

METHODS

Study Design:	Retrospective Cohort Study	
Study Population: Total n: 24,446 Short-term n: 24,807 Long-term n: 4,039	Inclusion Criteria Patients had to cross an international border and had to receive medical treatment at a GeoSentinel clinic for a presumed travel-related illness (only confirmed or diagnosed cases). June 1996-December 2008	Exclusion Criteria: Missing data, those traveling for immigration, Travelers who made multiple trips, travelers seen during travel, trip duration unknown, those travel between 1-6 months.
Data Collection Procedure		
Interview <u>Self Adm Survey</u> CASI CAPI Record Abstraction Administrative Data		

METHODS OF ANALYSIS

Data was entered into a Structured Query language database, analyzed using SAS 9
Categorical Variables: Chi-square Multivariate logistic regression was used for long term travelers adjusting for: sex, age, pre-travel advice, reason for travel, and geographic region visited

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

10% of all ill travelers seen at GeoSentinel sites are long-term travelers. Long-term travelers are more likely to be male and more often traveled to sub-Saharan Africa and South America than short term travelers. Predominant syndromes seen in long-term travelers after returning is febrile illness, gastrointestinal issues, and dermatologic problems. Long-term travelers were more likely to have giardia, malaria, and chronic diarrhea. Short-term travelers were more likely to get dengue.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion: Disease patterns differ significantly for long term vs. short-term travelers. More than 66% of long-term travelers had a pre-travel encounter, which disagrees with the airport surveys. Epidemiological surveillance of long-term travelers found that giardia is most commonly reported illness. Food safety practices worsened as length of stay increased. This data can highlight the importance of screening long-term travelers, and providing evidenced based pre-travel advice to those who are traveling for a long period of time (in this study > 6 months).
Strengths of the Study? Large sample size
Limitations of the Study? May not be generalizable since included those from GeoSentinel database that are people who sought treatment at specialized travel medicine places. Missing travel information eliminated 10% of records from the analysis.

Literature Review Form Article 10
Description of Study and Findings

INTRODUCTION

Article Title	Multicenter EuroTravNet/ GeoSentinel Study of Travel-Related Infectious Diseases in Europe
Author(s)	Phillippe Gautret, Patricia Schlagenhauf
Journal	Emerging Infectious Diseases
Date Published:	(year) 2009 (volume) 15 (pages) 1783-1789
What is the main objective of the study?	To determine the epidemiology of travel-related infectious diseases in a large set of ill returned European traveler's over a substantial period of time and to compare this with the epidemiology of disease in travelers from other industrialized countries outside Europe.

METHODS

Study Design:	Retrospective Cohort Study	
Study Population: Total n: 17,228 Classic n: 13,913 Immigrant n: 2,415 Expatriate n: 900	Inclusion Criteria Patients had to cross an international border and had to receive medical treatment at a GeoSentinel clinic for a presumed travel-related illness. This study included European travelers who were seen at a clinic between March 1997 and November 2007.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was entered into MS Access

Comparison of proportions: Pearson chi-square test

Analysis of Variance: Kruskal-Wallis tests (qualitative variables)

Multiple correspondence analysis used for diagnosis, exposures, regions; Logistic regression was used for OR by diagnosis

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

European travelers had a lower morbidity for certain diagnosis they non-European traveler's did, and higher for other diagnosis such as genitourinary infections, STDS, and respiratory infections. Malaria is the most commonly reported diagnosis among travelers returning with a fever. Dengue is the second most commonly reported febrile illness, particularly among those returning from Southeast Asia.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

European and non-European travelers may have a different code of behavior conduct that accounts for the difference in disease diagnosis. Dermatologic conditions being the leading cause of health problem reiterate the need for pre-travel health advice to support this. Clinicians encountering returning patients have an essential role in recognizing and communicating travel-associated public health risks.

Do their results agree or disagree with the other literature cited? Author did not cite any other information.

Strengths of the Study? Focuses on proportionate disease and the large number of patients in the database (reduces the population-specific bias)

Limitations of the Study? Diagnosis of illness with short incubation pd may be underrepresented. Incident rates cannot be calculated because of absence of denominator data.

Literature Review Form Article 11
Description of Study and Findings

INTRODUCTION

Article Title	Hepatitis A, Typhoid, and Malaria Among Travelers – Surveillance Data from Quebec
Author(s)	Sylvie Provost, Suzanne Gagnon
Journal	Journal of Travel Medicine
Date Published:	(year) 2006 (volume) 13 (pages) 219-226
What is the main objective of the study?	To review surveillance data from three infectious diseases to document the epidemiological context of travel health interventions

METHODS

Study Design:	Retrospective Cohort Study	
Study Population: Total n: 267 Hepatitis A n: 112 Yellow Fever n: 27 Malaria n: 128	Inclusion Criteria Those who had available data on any of these diseases, reported travel during 2000-2002.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was entered into MS Access

Not reported

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

Of the 108 Hepatitis A cases determined to be due to international travel, 101 had traveled outside of Canada and the United States. Hepatitis A cases occurred more in younger travelers. 21 of the Typhoid cases had traveled somewhere other than the US and Europe. 62% contracted typhoid while in an Indian subcontinent. High risk for typhoid came from Asia. Majority of cases were in travelers whose duration of trip was 4 weeks or more. 72% of the malaria cases reported travel to Africa, and 17% in the Americas. In over 2/3rd of cases reported, malaria was caused by *P. falciparum*.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

This data helps to target groups at a higher risk and attempts to provide an overview of trends through time. The risk of Hepatitis A is greater in Africa, Central and South America. Indian subcontinent involves a higher risk of typhoid, and Africa constitutes a very significant risk of malaria. Purpose of travel is also associated with risk of disease; this shows that VRF travelers could benefit from more attention in educational materials and pre-travel health recommendations.

Strengths of the Study? None

Limitations of the Study? Inaccurate reporting of data from primary care doctors, inaccurate case investigations by health departments, unable to reach the person with the disease and therefore no investigation takes place. Under diagnosis and underreporting are main issues here.

Literature Review Form Article 12
Description of Study and Findings

INTRODUCTION

Article Title	A Description of Travel Medicine in General Practice: A Postal Questionnaire Survey
Author(s)	Nourieh Hoveyda, Paula McDonald
Journal	Journal of Travel Medicine
Date Published:	(year) 2004 (volume) 11 (pages) 295-299
What is the main objective of the study?	To determine the current practice with regard to pre-travel health advice in general practices within South Cheshire Health authority and to gather information on quality control.

METHODS

Study Design:	Cross-Sectional	
Study Population: Total n: 78 Nurses: 97% Doctors: 3%	Inclusion Criteria Had to be the leader of the general practice in South Cheshire Health Authority.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Frequencies among responses

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

The response rate was initially 65% after the second mailing the response rate jumped to 86%. Only 10% of the respondents could provide information on the number of people seeking travel health advice over the past year. The most common source of information for those seeking advice was a wall immunization chart that the nurses pointed out to them. 29% of those giving advice had not been to a travel medicine course in over 4 years.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

These places tend to rely on vaccinations as the appropriate pre-travel health advice, but miss out on many other things. The lack of time with the travelers, lack of training on the nurses and doctors are a serious threat to the safety of travelers. Nurses and doctors may be giving inconsistent and inappropriate advice and medications. Further research needs to be done to assess the accuracy of the information doctors and nurses provide.

Do their results agree or disagree with the other literature cited? No literature cited

Strengths of the Study?

Did a second mailing to increase response rate

Limitations of the Study?

Not generalizable, the doctors at the Cheshire Health Authority may not be indicative of doctors in general. Small sample size was used; the study did not do an accurate job of assessing the knowledge of nurses and doctors, only looked at the references used to gain their knowledge.

Literature Review Form Article 13
Description of Study and Findings

INTRODUCTION

Article Title	Malaria in Travelers: A Review of the GeoSentinel Surveillance Network
Author(s)	Karin Leder, Jim Black, Dan O'Brien
Journal	Infectious Disease Society of America
Date Published:	(year) 2004 (volume) 39 (pages) 1104-1112
What is the main objective of the study?	To highlight characteristics of malaria in travelers and to help provide evidence-based recommendations regarding prophylaxis's and advice.

METHODS

Study Design:	Retrospective Study	
Study Population: Total n: 1140 Male: 69% Mean age: 34.8	Inclusion Criteria Patients had to cross an international border within 10 years before presentation and had to seek medical treatment at a GeoSentinel clinic for a presumed travel-related illness. This analysis focused on 6 months prior to presentation. Data entered into the database between November 1997 and December 2002 were examined.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Patient data was entered anonymously into an MS access database, analyzed using Strata 6.0 and MS excel 97
RR calculations were determined for those traveling during 2000-2002
Comparisons: Chi-Square and Non-parametric tests: Kruskal-wallis test

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

50% of the cases were reported from Europe, 31% North America, 10% Australasia, 8% Middle East, and 1% south-central Asia. Mixed infections were reported in 21 cases. 60% of cases reported infection by *P. falciparum* malaria while 24% reported *P. vivax*. Only 37% reported a pre-travel encounter. Three deaths occurred all from *P. falciparum* infection. Mean travel duration was 34 days. The most common reason for travel was visiting friends or relatives (VFR), which 85% did not seek pre-travel health advice. 74% of the *P. falciparum* cases were contracted in Sub-Saharan Africa, whereas only 34% of the *P. vivax* was contracted there. Compared to other diseases, those with malaria were more likely to be male, VFR, have a hospital admission, and present with a febrile illness.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Short duration of exposure is sufficient for contracting malaria. *P. Falciparum* is associated with severe malaria (3 deaths and 33 patients with severe malaria). A substantial amount of travelers presented several months after travel, which highlights the need to remain vigilant to ensure diagnosis occurs. Those who had a pre-travel encounter had a delayed presentation possibly due to prophylaxis. This helps to identify those at high risk and may serve to guide clinicians and educational materials.

Strengths of the Study?

Provides a global perspective of traveler's with malaria. Compared malaria with other diseases in database.

Limitations of the Study?

WHO definition of cerebral malaria and non-cerebral malaria were not used, diagnosis was based upon clinical symptoms. GeoSentinel database travelers may not be like all travelers.

Literature Review Form Article 14
Description of Study and Findings

INTRODUCTION

Article Title	Seasonality, Annual Trends, and Characteristics of Dengue among Ill returned Travelers, 1997-2006.
Author(s)	Karin Leder, Jim Black, Dan O'Brien
Journal	Emerging Infectious Diseases
Date Published:	(year) 2008 (volume) 14 (pages) 1081-1088
What is the main objective of the study?	To determine if Dengue endemics occur in different seasons and to review the annual trends of Dengue in travelers that seek medical care at a GeoSentinel Clinic.

METHODS

Study Design:	Retrospective Study	
Study Population: Total n: 24,920 Dengue n: 522	Inclusion Criteria Patients had to cross an international border and had to seek medical treatment from October 1997 to March 1, 2006 at a GeoSentinel clinic for a presumed travel-related illness.	Exclusion Criteria: Traditional travelers Those that did not meet Dengue diagnosis criteria
Data Collection Procedure Interview Self Adm Survey CASI CAPI Record Abstraction <u>Administrative Data</u>		

METHODS OF ANALYSIS

Data was analyzed using SAS 9.0
Chi-Square test was done for comparison of Dengue vs. malaria

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

A comparison of the annual trends of dengue showed sustained increases in dengue proportionate morbidity in 1998 and 2002, with small peaks in 2003 and 2005. All correspond with known dengue epidemic years. Travel-related dengue originated most commonly in Southeast Asia. In Southeast Asia, dengue typically peaks during June and September in non-outbreak years. When comparing with years of known outbreak the seasonal patterns change drastically. Dengue was found to affect both genders equally, whereas malaria typically more common in males. Duration of travel was longer for those with dengue.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Dengue could be added to the list of diseases for which pre-travel advice can include information on the seasonality of the disease. Dengue is a risk for all travelers without respect to gender, age, pre-travel preparation, and duration of stay. Educational materials and clinicians should focus on anti-vector measures.

Strengths of the Study?

Global perspective of Dengue

Limitations of the Study?

GeoSentinel database travelers may not be like all travelers, since these individuals seek treatment at travel medicine clinics. Those who have more severe forms an illness does may not seek medical treatment and would more likely go to the hospital.

Literature Review Form Article 15
Description of Study and Findings

INTRODUCTION

Article Title	Travel Health Risk Perceptions and Prevention Behaviors of U.S. Study Abroad Students
Author(s)	Laurie Hartjes, Linda Baumann, and Jeffrey Henriques
Journal	Journal of Travel Medicine
Date Published:	(year) 2009 (volume) 16 (pages) 338-343
What is the main objective of the study?	This study investigated the travel health risk perceptions and prevention behaviors to guide interventions that address the emerging health needs of US study abroad students.

METHODS

Study Design:	Cross-Sectional	
Study Population: Eligible n: 1000 Total n: 318 Male: 84% Mean age: 20	Inclusion Criteria Student had to be 18 years of age, and a student about to study abroad.	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Data was analyzed using SPSS 10.0
Survey was done in a likert score

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

11% of the students who had reported a travel destination said that they have received a malaria vaccine (which does not exist). The top five risks from traveling abroad were found to be contaminated food and water, psychological distress, sexual assault, excessive sun exposure, and motor vehicle accident. Many students did not know if they are or had ever traveled to an area of malaria risk. Many students did not perceive disease as an important risk

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

This highlights the gap in knowledge and prevention methods among US students about to travel abroad. This study can provide useful information for clinicians who give students pre-travel health advice. Also underscores the need for education of all types of travelers including students.

Strengths of the Study?

Not a very good study – hard to find

Limitations of the Study?

Selection bias – very low response rate to survey. Relies on self-reporting.

Literature Review Form Article 16
Description of Study and Findings

INTRODUCTION

Article Title	Inadequacies in Health Recommendations Provided for International Travelers by North American Travel Health Advisors
Author(s)	Jay Keystone, Robert Dismukes
Journal	Journal of Travel Medicine
Date Published:	(Year) 2009 (volume) 1 (pages) 72-78
What is the main objective of the study?	To determine if Pre-travel advice given by North American health advisors shows a considerable variability in the accuracy and extent necessary for effective travel disease prevention and treatment.

METHODS

Study Design:	Cross-Sectional	
Study Population: Eligible n: 1239 Total n: 173 USA n: 112 Canada n: 63	Inclusion Criteria World Health Organization designated yellow fever centers in Canada and in the United States	Exclusion Criteria: None

Data Collection Procedure

Interview Self Adm Survey CASI CAPI Record Abstraction Administrative Data

METHODS OF ANALYSIS

Statistical analysis was carried out by Students t-test and chi squared analysis.

RESULTS: Briefly describe main study results including: main risk estimates; variables adjusted for

20% to 75% of the vaccinations that the doctor or nurse would recommend prior to travel to a made up destination were incorrect. Overall Canadians provided more accurate vaccination advice compared to Americans. In addition, yellow fever and cholera vaccinations were often recommended indiscriminately, and haphazard advice was given regarding the administration of meningococcal, rabies, and typhoid vaccines. In several scenarios Americans gave incorrect recommendations for antimalarial chemoprophylaxis.

DISCUSSION AUTHOR'S STATEMENTS

Conclusion:

Travelers do not uniformly seek pre-travel health advice from health care providers. In one survey, only 42% of American travelers consulted physicians prior to making journeys to the developing world. The results of this survey show a great variability in health recommendations provided to international travelers by North American health advisors. Continued surveillance of travel related illness, followed by consensus development regarding recommendations, would help ensure a higher quality of health care advice for international travelers. Despite the growing efforts to further educate those responsible; higher quality of health advice needs to become a priority.

Strengths of the Study?

Assessed their knowledge through scenarios instead of asking a KAP survey

Limitations of the Study?

Had only a 10% response rate for the United States and a 50% response rate in Canada, which is very alarming for selection bias. The Canadian respondents were mostly nurses the American were mostly physicians, inadequate to compare their advice. In addition small sample sizes.

APPENDIX B

Disease	Agent	Incubation Period	Mode of Transmission	Endemicity	Chief Symptoms	Risk Factors
Malaria	Parasite: <ul style="list-style-type: none"> • <i>Plasmodium falciparum</i>, • <i>P. vivax</i>, • <i>P. ovale</i>, • <i>P. malariae</i> 	7 to 14 days	Mosquito <ul style="list-style-type: none"> • <i>Anopheles</i> 	<ul style="list-style-type: none"> • Africa • Parts of Asia • Central America 	<ul style="list-style-type: none"> • Fever • Flu-like symptoms 	<ul style="list-style-type: none"> • Young children, • Travelers from an area not endemic to malaria, • Pregnant women
Dengue	Flavivirus <ul style="list-style-type: none"> • DENV1 • DENV2 • DENV3 • DENV4 	2 weeks	Mosquitoes <ul style="list-style-type: none"> • <i>Aedes aegypti</i> • <i>Aedes albopictus</i> 	<ul style="list-style-type: none"> • Most tropical regions • South Pacific • Asia • Caribbean 	<ul style="list-style-type: none"> • Fever • Rash • Joint Pain • Headache 	<ul style="list-style-type: none"> • Travelers to a dengue endemic area
Amebiasis	Protozoan Parasite: <ul style="list-style-type: none"> • <i>Entamoeba histolytica</i> 	2 to 4 weeks	<ul style="list-style-type: none"> • Fecal-oral 	Worldwide	<ul style="list-style-type: none"> • Loose stools • Stomach pain • Asymptomatic 	<ul style="list-style-type: none"> • Travelers to a developing country • Men who have sex with men
Giardiasis	Protozoan Parasite: <ul style="list-style-type: none"> • <i>Giardiasis intestinalis</i> 	1 to 2 weeks	<ul style="list-style-type: none"> • Fecal-oral 	Worldwide	<ul style="list-style-type: none"> • Diarrhea • Gas • Greasy stools • Stomach cramps • Nausea 	<ul style="list-style-type: none"> • Children • Backpackers, Hikers • International travelers • Men who have sex with men
Hepatitis A	Picornavirus: <ul style="list-style-type: none"> • HAV 	28 days	<ul style="list-style-type: none"> • Person-to-person contact • Contaminated food and water • Uncooked foods 	Worldwide	<ul style="list-style-type: none"> • Fever • Fatigue • Loss of appetite • Nausea • Vomiting • Jaundice • Dark Urine • Joint pain 	<ul style="list-style-type: none"> • Travelers to areas of high endemicity • Men who have sex with men • Injection drug users • Persons with clotting factors

APPENDIX C



Travel Health: Knowledge's, Attitudes, and Practices

THE SURVEY

PURPOSE:

To assist the Philadelphia Department of Public Health in developing educational materials about travel health.

SURVEY CONTENT:

Asks questions about your trip and your travel planning

DURATION:

10 minutes or less

INFORMATION FOR PARTICIPANTS

WHO IS ASKED TO PARTICIPATE:

Randomly selected passengers boarding an international flight who are 18 years or older

- Participation is voluntary
- Participation assumes consent to use answers

YOUR PRIVACY WILL BE PROTECTED:

Responses will be anonymous

If you have any questions about the survey, please contact:

The Philadelphia Department of Public Health
Division of Disease Control, Acute Communicable Disease Program
215-685-6740

Thank you for your participation

APPENDIX D



If you are returning to your country of residence: Answer these questions based on your travel to the US.

I. Basic Demographics

1. What is your age (in years)?

☐ 18 - 25 ☐ 26 - 35 ☐ 36 - 45 ☐ 46 - 60 ☐ Older than 60

2. What is your gender?

☐ Male ☐ Female

3. Is the United States your country of residence?

☐ Yes ☐ No

4. Have you ever traveled to a country outside of the U.S. before?

☐ Yes ☐ No

5. How many people (family or tour group) are traveling with you (not including yourself)?

II. Travel Preparation and Barriers to Preparation

6. What is your travel destination? Country (ies): _____

7. Is this your first time traveling to this country?

☐ Yes ☐ No

8. How long are you staying at your destinations (Specify: days, months, years)? _____

9. What is the main purpose of your trip (Check all that apply)?

☐ Business ☐ Tourism/ Pleasure ☐ Visiting friends or relatives ☐ Education
☐ Religion ☐ Other _____

10. Is your primary destination a tourist/vacation area?

☐ Yes ☐ No

11. Do you plan on visiting rural areas/ countryside?

☐ Yes ☐ No

12. What kind of sleeping arrangements did you make for this trip (Check all that apply)?

☐ Hotel/Resorts ☐ Dorm/Youth hostel ☐ Camping ☐ Private home ☐ Other: _____

13. When did you begin planning this trip prior to your departure date?

☐ At least one-month prior ☐ 2 to 4 weeks prior ☐ 1 to 2 weeks prior ☐ During the week of the trip

14. Did you get general travel information about your destination prior to your trip?

☐ Yes ☐ No

→ If Yes: Where did you get the information? (Check all that apply)

☐ Family or Friend ☐ Internet ☐ Travel agent ☐ Travel books
☐ Other: Specify _____

15. Did you seek travel health or medical advice prior to departure?

☐ Yes ☐ No



If Yes: When did you get the pre-travel advice?

☐ 4 or more weeks prior to travel ☐ 2-4 weeks prior ☐ 1-2 weeks prior
☐ Within the week of travel

Where did you get this information (Check all that apply)?

☐ Primary doctor ☐ Travel health clinic ☐ Pharmacist ☐ Health Department
☐ Internet: Specify _____ ☐ Travel Literature: Specify _____
☐ Other: Specify _____

16. If you did not seek medical advice prior to travel: Why not?

☐ Too busy ☐ No medical concerns ☐ Didn't know where to find information
☐ Costs too much ☐ I already knew the necessary information
☐ Other: Specify _____

III. Travel Health

17. To your knowledge, have you been vaccinated for any of these diseases? (Check all that apply).

☐ Hepatitis A ☐ Hepatitis B ☐ Measles (MMR) ☐ Typhoid ☐ Polio ☐ Yellow Fever
☐ Rabies ☐ Japanese Encephalitis

18. Prior to your travel date did you receive or purchase any preventative medications for this trip specifically (including vaccines)?

☐ Yes ☐ No



If yes to question 18: What type of preventative medication did you receive (including vaccines)?

☐ Vaccines: Specify _____

☐ Anti-Malarial Medications: **Specify** _____

If you received anti-malarial medicine, when did you begin taking them? _____

☐ Non-prescription (over-the-counter) medicine: **Specify** _____

19. Do you plan on participating in any outdoor activities (hiking, backpacking, swimming etc)?

☐ Yes ☐ No



If Yes: what kind of outdoor activities? _____

20. Do you plan on doing any of these things while on your trip? Check all that apply

☐ Using Bug Repellant ☐ Covering arms/legs while outside at night
☐ Sleeping with windows closed or under mosquito nets

21. Check all of the foods listed below that you think have the potential to cause illnesses if eaten while traveling outside of the United States.

☐ Ice cream ☐ Food from street vendor's ☐ Tap water ☐ Ice cubes ☐ Milk
☐ Sushi/Shellfish ☐ Raw fruit or vegetables

Appendix E

Table: Distribution of KAP Study Variables

	n	%
First Time Traveling to Destination (n = 201)		
Yes	98	49
Reason for Trip (n = 201)		
Business	35	17
Tourism	123	63
Visiting friends and relatives	66	33
Education	19	9
Religion	8	4
Primary Destination a Tourist/Vacation Area (n = 201)		
Yes	123	61
Visiting rural areas (n = 201)		
Yes	125	62
Sleeping Arrangements (n = 201)		
Hotel	137	68
Camping	2	1
Private Home	58	29
When began planning for trip (n = 201)		
At least one month prior	160	80
2 to 4 weeks prior	16	8
1 to 2 weeks prior	16	8
During the week of the trip	9	5
Obtained General Information (n = 200)		
Yes	166	83
Source of Information (n = 166)		
Family/Friends	81	49
Internet	110	66
Travel Agent/Books	91	55
Vaccination Coverage (n = 194)		
Hepatitis A	99	51
Hepatitis B	98	51
Measles (MMR)	127	65
Typhoid	68	35
Polio	123	63
Preventative medications/vaccinations for trip (n = 195)		
Yes	33	17
Type of Medications/Vaccinations (n = 33)		
Anti-malarial	9	27
Over the Counter Medications	20	60
Vaccines	8	24
Participating in outdoor activities (n=194)		
Yes	87	45

